

NRC Update: Fukushima Lessons Learned

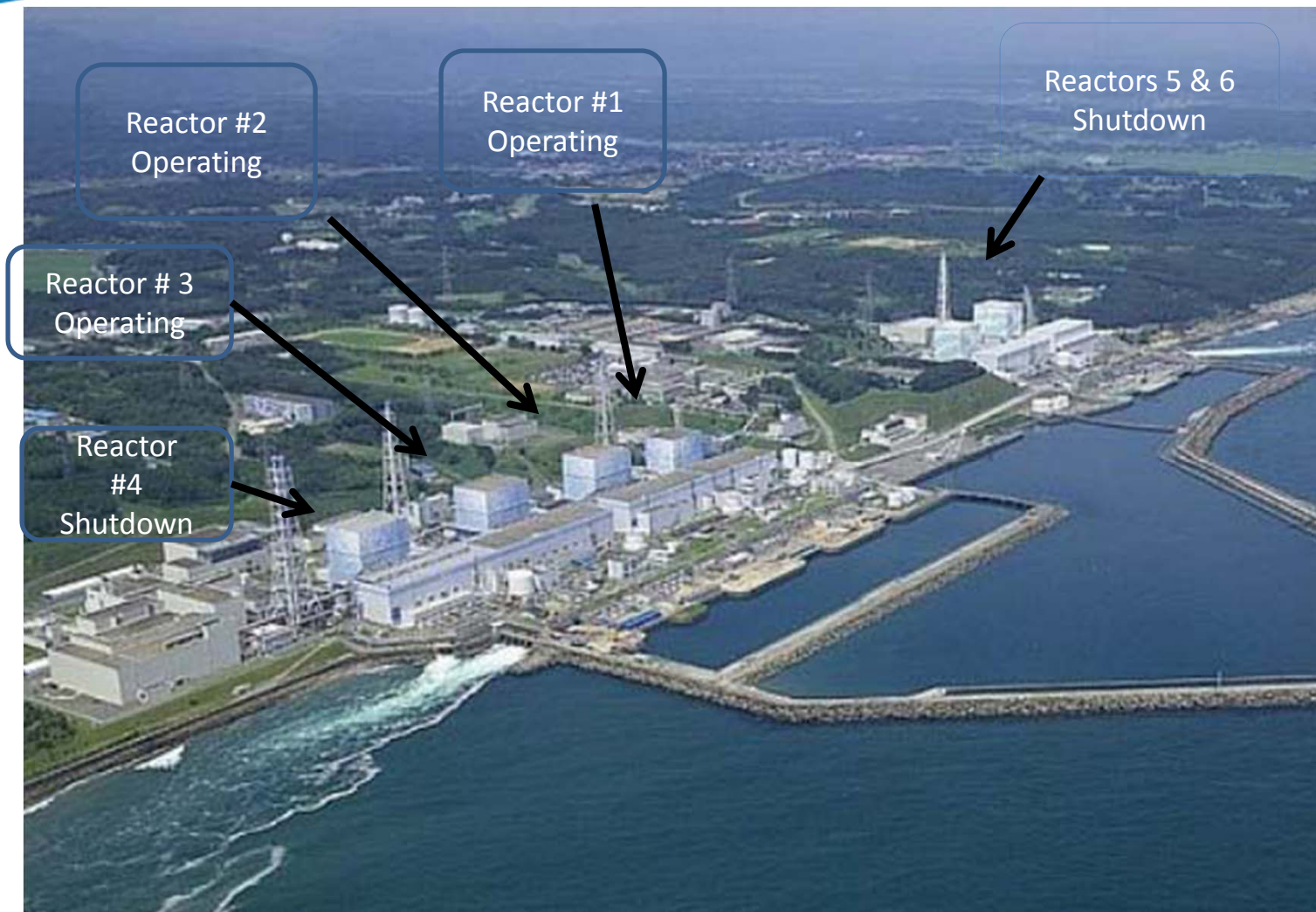
Lauren Gibson, U.S. Nuclear Regulatory Commission



Agenda

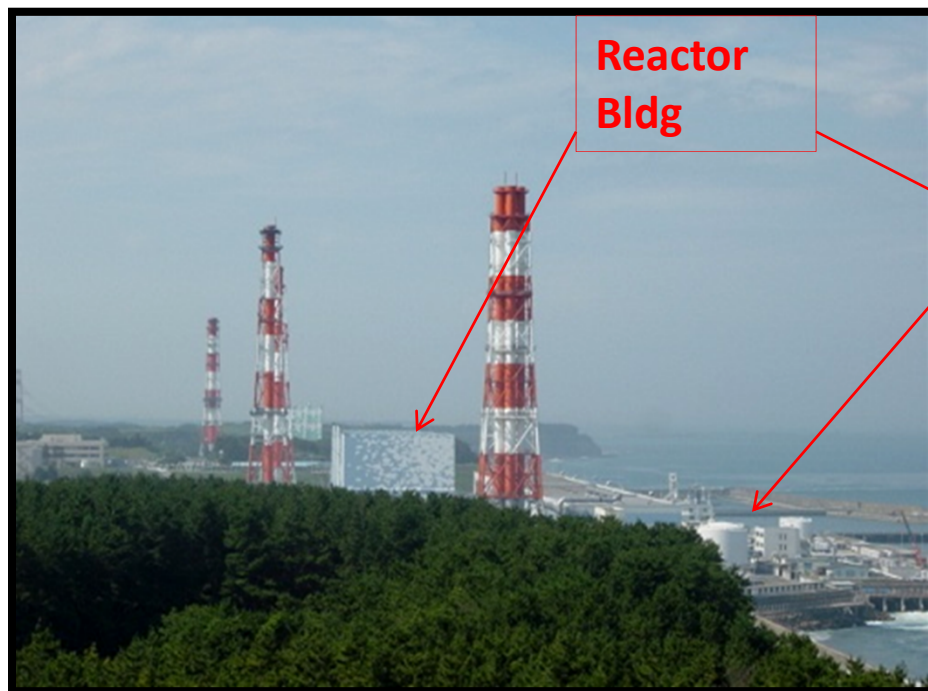
- Overview of the Accident
- NRC Response
- Identifying Lessons-Learned
- Implementing Lessons-Learned
- Other Regulated Facilities

Fukushima Daiichi Site Before the Event



Tsunami

- Site designed to withstand ~6 meters (20 foot) tsunami
- Actual size estimated ~14 meters (46 feet)



After Hydrogen Explosions



UNIT 4

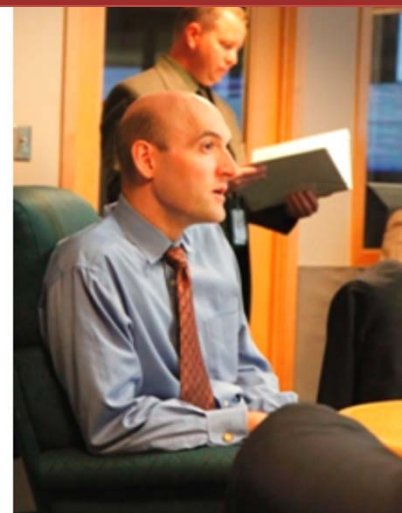
UNIT 3

UNIT 2

UNIT 1

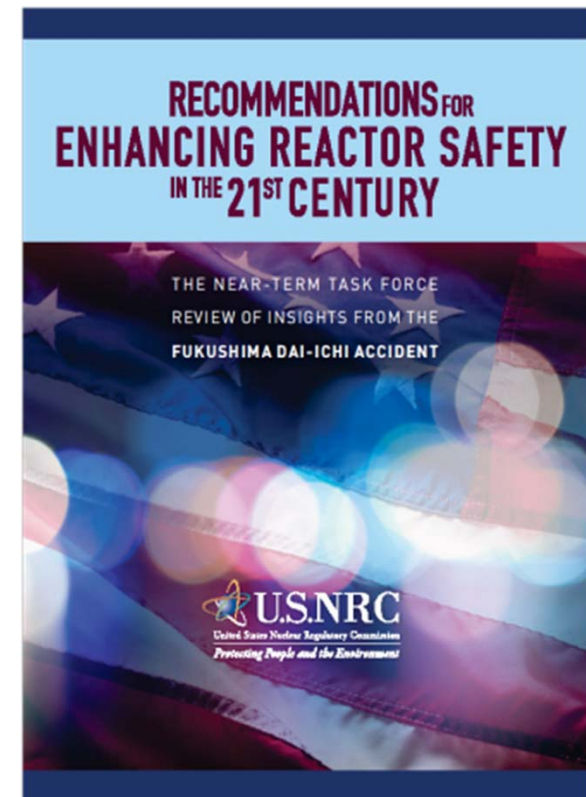
NRC Response

Executive, Reactor Safety, Protective Measures, Safeguards, Public Affairs, and Liaison Teams



Lessons Learned: NRC's Near-Term Task Force

- Within weeks of the accident, NRC created a task force to review the events and provide recommendations to enhance safety at U.S. plants
 - Report issued July 2011
 - Concluded that a similar sequence of events in the US is unlikely and there are no imminent risks of continued operation and licensing activity
 - Identified 12 Overarching Potential Safety Enhancements



Prioritization of NTTF Recommendations

- Subsequent to the NTTF Report, NRC staff prioritized the recommendations:
 - Tier 1 - To be implemented without unnecessary delay
 - Tier 2 - Could not be initiated in the near term due to resource or critical skill set limitations
 - Tier 3 - Require further staff study to determine if regulatory action is necessary
- Tools to implement recommendations include Orders, Rulemaking, and Requests for Information

Mitigation Strategies For External Events



Requires a three-phase approach for maintaining or restoring core cooling, containment, and spent fuel cooling

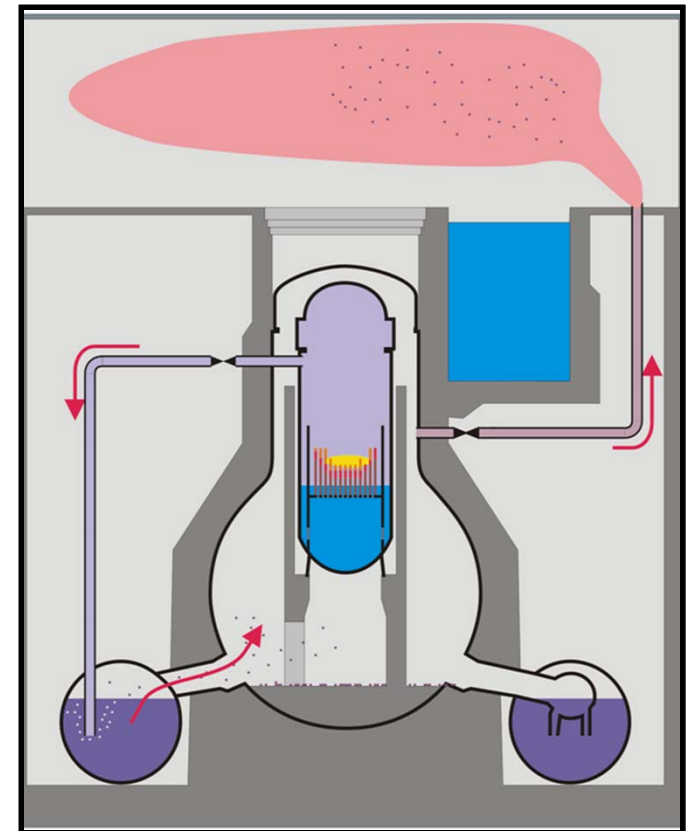
Phase	Licensee may use
Initial	Installed equipment
Transition	Portable, onsite equipment
Final	Resources obtained from offsite



Containment Venting System



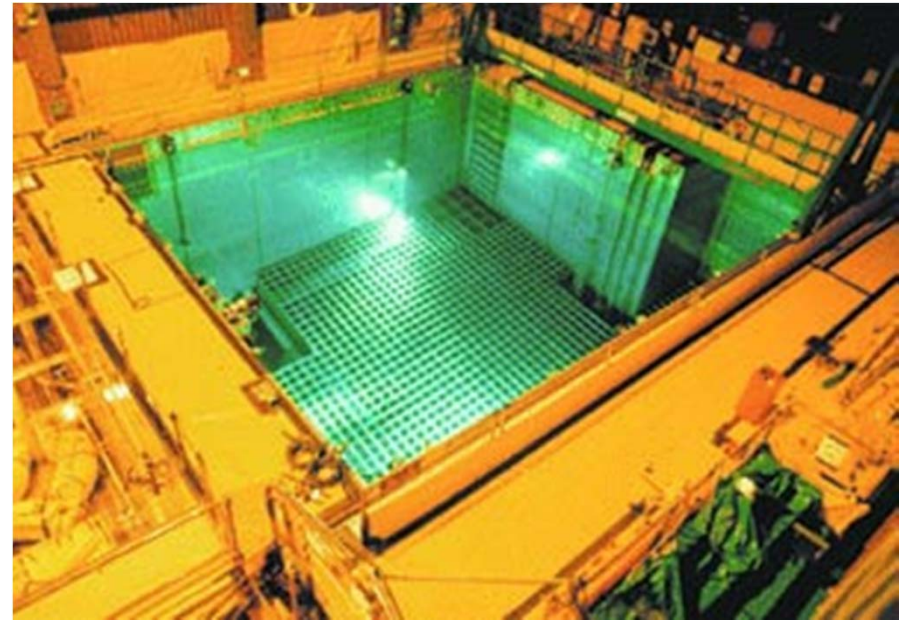
- Applies to boiling water reactors with certain designs (Mark I/II)
- Vents help control pressure by removing heat
- May help prevent core damage
- Must continue to function if core damage/melting occurs
- Required to work when all power is lost



Spent Fuel Pool Instrumentation

Requires installation of water level instrumentation to indicate:

- 1 – Normal fuel pool level
- 2 – Below-normal level that still provides radiation shielding
- 3 – Very low level, near top of fuel racks, where immediate action to add make-up water should be taken



Requests for Information

NRC asked licensees to:



Inspect or “walk down” currently installed earthquake and flooding protection features, and correct degraded conditions



Use present-day information to reevaluate the potential effects of an earthquake or flooding event



Enhance emergency plans to ensure sufficient staffing and communication capabilities if multiple reactors at a single site are affected by the same event



Seismic and Flooding Reevaluations

What is the new hazard?

How would the plant respond to the new hazard?

Does the licensing basis need to change?

Rulemaking Activities



Station Blackout Mitigation Strategies (SBOMS)

- Will require licensees to have mitigating measures to cope with an extended loss of ac electrical power (2016)



Onsite Emergency Response Capabilities

- Will require severe accident management guidelines and smooth transition from EOPs to SAMGs to EDMGs (2016)



Filtering and Confinement Strategies



- Will consider additional measures to limit potential release of radioactive material using confinement strategies or filtration of radioactive material released during a severe accident (2017)

Other Regulated Facilities

- Do the lessons learned apply to other facilities?



- The NRC expects to complete its evaluation this summer.

Conclusion

- NRC implementing safety enhancements at U.S. plants
- Considerable progress has been made
- Substantial safety enhancements by 2016
- No imminent risk from continued operation of U.S. nuclear power plants

More Information

Public website

From www.nrc.gov, find link under
“Spotlight” section called “Japan
Lessons Learned”

THANK YOU

Tier 2 Recommendations

- Spent Fuel Pool Makeup Capability
 - Addressed under mitigation strategies*
- Emergency Preparedness
 - Addressed under mitigation strategies*
 - Multiunit dose assessment capability in place by end of 2014
- Reevaluation of Other Natural Hazards
 - Dependent on insights from seismic/flooding reevaluations and staff resources
 - Request for Information planned after the seismic and flooding hazards are resolved

Tier 3 Recommendations

- 2.2 Perform periodic confirmation of seismic and flooding hazards
- 3 Ensure enhanced capability to prevent /mitigate seismically induced fires and floods
- 5.2 consider reliable hardened vents for other containment designs
- 6 Hydrogen control and mitigation inside containment or in other buildings
- 9.1/9.2 Emergency preparedness (EP) enhancements for prolonged SBO and multiunit events
- 9.3 Improve ERDS capability
- 10 Additional EP topics for prolonged SBO and multiunit events
- 11 EP topics for decision-making, radiation monitoring, and public education
- 12.1 Reactor Oversight Process modifications to reflect the recommended defense-in-depth framework
- 12.2 Staff training on severe accidents and resident inspector training on SAMGs
 - Revisit Emergency Planning Zone Size
 - Pre-stage potassium iodide beyond 10 miles
 - Expedited transfer of spent fuel to dry cask storage
 - Reactor and Containment Instrumentation